JOURNAL OF HEALTH AND SOCIAL SCIENCES

Journal of Health and Social Sciences (JHSS)
The Italian Journal for Interdisciplinary Health and Social Development *EDIZIONI FS Publishers*

Original Article in Occupational Health Psychology

Prevalence and factors associated with burnout syndrome in resident physicians: A cross-sectional study in Italy

Luca DI GIAMPAOLO[1*], Andrea ROSSETTI[2], Teresa GALANTI[3], Simone DE SIO[4], Luca COPPETA[5], Hector NIETO[6], Hiroo WADA[7], Niu QUIAO[8], Younes RAMI[9], Hicham KHABBACHE[10], Driss AIT ALI[11], Amelia RIZZO[12], Kavita BATRA[13], Murat YILDIRIM[14], Mahmood BAHRAMIZADEH[15], Francesco CHIRICO[16]

Affiliations:

[1] Department of Innovative Technologies in Medicine & Dentistry, University "G. d'Annunzio", Chieti-Pescara, Italy. E-mail: luca.digiampaolo@unich.it ***ORCID****: https://orcid.org/0000-0003-3315-7197.*

[2]Department of Innovative Technologies in Medicine & Dentistry, University "G. d'Annunzio", Chieti-Pescara, Italy. E-mail: catena93go@gmail.com.

[3]Department of Psychological, Health and Territorial Sciences, University "G. d'Annunzio", Chieti-Pescara, Italy. E-mail: teresa.galanti@unich.it ***ORCID****: https://orcid.org/0000-0003-1926-4877.*

[4] Research Unit of Occupational Medicine, University "La Sapienza", Roma, Italy. E-mail: simone.desio@uniroma1.it ***ORCID****: https://orcid.org/0000-0003-4538-3941.*

[5]Department of Biomedicine and Prevention, University "Tor Vergata", Roma, Italy. E-mail: luca.coppeta@uniroma2.it ***ORCID****: https://orcid.org/0000-0003-2470-6107.*

[6]Occupational Medicine School, University of Business and Social Sciences, Buenos Aires C1061 ABA, Argentina. E-mail: hnieto@live.com.ar ***ORCID****: https://orcid.org/0009-0007-9325-8404.*

[7]Department of Public Health & Division of Medical Education, Juntendo University Graduate School of Medicine, Tokyo, Japan. E-mail: h-wada@iuntendo.ac.jp ***ORCID****: https://orcid.org/0000-0002-0752-3790.*

[8]School of Public Health, Shanxi Medical University, China. E-mail: niuquiao55@sxmu.edu.cn ***ORCID****: https://orcid.org/0000-0003-0015-3341.*

[9]Biodiversity, Ecology and Genome Laboratory, 4 Avenue Ibn Battouta, Faculty of Sciences, Mohammed V University in Rabat, B.P. 1014 Morocco. Email: younesrami01@gmail.com ***ORCID****: https://orcid.org/0000-0003-2313-8734.*

[10]Laboratory of «Morocco: History, Theology and languages, » Department of Psychology, Faculty of Arts and Human Sciences Fès-Saïss, Sidi Mohamed Ben Abdellah University, Fez-Morocco. Director of Lifelong Learning Observatory (UNESCO/ USMBA). Email: hicham.khabbache@usmba.ac.ma ***ORCID:*** *https://orcid.org/0000-0001-9587-2829.*

[11]Laboratory of «Morocco: History, Theology and languages, » Department of Psychology, Faculty of Arts and Human Sciences Fès-Saïss, Sidi Mohamed Ben Abdellah University, Fez-Morocco. Email: driss.aitali@usmba.ac.ma ***ORCID:*** *https://orcid.org/0000-0001-5043-9677.*

[12]Department of Clinical and Experimental Medicine and Department of Cognitive Sciences, Psychological, Educational, and Cultural Studies, University of Messina, Messina, Italy. E-mail: amrizzo@unime.it ***ORCID****: https://orcid.org/0000-0002-6229-6463.*

[13] Department of Medical Education and Office of Research, Kirk Kerkorian School of Medicine at UNLV, University of Nevada, Las Vegas, United States of America. E-mail: kavita.batra@unlv.edu ***ORCID****: https://orcid.org/0000-0002-0722-0191.*

[14]Department of Psychology, Faculty of Science and Letters, Agri Ibrahim Cecen University, Ağrı, Turkey. E-mail: muratyildirim@agri.edu.tr ***ORCID****: https://orcid.org/0000-0003-1089-1380.*

[15]Department of Orthotics and Prosthetics, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran. E-mail: mbzoandp@gmail.com ***ORCID:*** *0000-0003-4719-938x*

[16]Post-Graduate School of Occupational Health, Catholic University of the Sacred Heart, Rome, Italy. Department of Health Service, Italian State Police, Ministry of the Interior, Milan, Italy. E-mail: medlavchirico@gmail.com ***ORCID****: https://orcid.org/0000-0002-8737-4368.*

J Health Soc Sci 2024, 9, 3, 379-398. Doi: 10.19204/2024/PRVL5.

Corresponding Author:

Prof Luca Di Giampaolo, School of Specialization in Occupational Medicine - Department of Innovative Technologies in Medicine & Dentistry, University "G. d'Annunzio" of Chieti and Pescara, Italy. E-mail: luca.digiampaolo@unich.it

Abstract

Introduction: Burnout syndrome is a psychological condition marked by emotional exhaustion, depersonalization, and diminished personal accomplishment due to chronic workplace stress. Despite its significance, few studies have specifically documented burnout levels among resident physicians. This study aims to assess the prevalence of burnout and its associated factors within this population.

Methods: We conducted a cross-sectional survey involving 160 resident physicians in Italy. To evaluate levels of emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA), we utilized the Maslach Burnout Inventory. Additionally, we assessed work-life balance using questions related to Free-time satisfaction (FTS), Free-Time Satisfaction Reduction (FTRS), and Work-problems pervasiveness (WPP).

Results: The analysis revealed that 30% of residents had high levels of emotional exhaustion, with an equal percentage reporting low levels. For depersonalization, 26.88% of participants reported high levels. In contrast, only 3.75% of residents report high levels of personal accomplishment. Furthermore, our findings indicate that only work-related factors influence burnout levels in our sample.

Discussion: Consistent with previous research, our results demonstrate higher levels of emotional exhaustion and depersonalization, and lower levels of personal accomplishment among resident physicians. These findings support existing studies that burnout is strongly associated with work-related factors over individual-level demographic factors. Furthermore, residents who maintain a good work-life balance report lower burnout levels compared to those who struggle to achieve this balance.

Take-home Message: This study provides insight into burnout levels among resident physicians, emphasizing the urgent need for interventions aimed at enhancing their well-being and workplace effectiveness.

Keywords: Burnout; prevalence; occupational health; work-life balance.

OHW = Overtime Hours, Workload

NSW = Night Shift Workload

Cite this paper as: Di Giampaolo L, Rossetti A, Galanti T, De Sio S, Coppeta L, Nieto H, Wada H, Quiao N, Rami Y, Khabbache H, Ait Ali D, Rizzo A, Batra K, Yildirim M, Bahamizadeh M, Chirico F. Prevalence and factors associated with burnout syndrome in resident physicians: A cross-sectional study in Italy. J Health Soc Sci. 2024;9(3):379-398. Doi: 10.19204/2024/PRVL5.

Received: 10 May 2024; Accepted: 25 August 2024; Published: 15 September 2024

INTRODUCTION

The concept of Burnout Syndrome emerged as a pivotal concept in the mid-1970s, primarily through the work of psychoanalyst Herbert Freudenberger [1–3]. Freudenberger identified burnout as a significant social issue warranting attention and targeted interventions [4,5]. According to Freudenberger and Richelson [6], burnout manifests as a state of fatigue or frustration resulting from an event, lifestyle, or relationship that fails to produce the expected rewards. Similarly, Kahn [7] describes burnout as a syndrome characterized by inadequate attitudes towards clients and oneself, often accompanied by unpleasant physical and emotional symptoms.

Schaufeli et al. [8] characterize burnout as a persistent and negative work-related state affecting otherwise healthy individuals marked by exhaustion, anxiety, tension (distress), a diminished sense

of efficacy, decreased motivation, and maladaptive work behaviors. Maslach and colleagues [3] suggest that burnout syndrome is particularly prevalent among those engaged in prolonged interactions with individuals in need, often arising from poorly managed professional and emotional stress within contexts of job dissatisfaction [9]. According to Attenello [10], burnout typically begins with emotional exhaustion, leading to psychological isolation, cynicism, and detachment in interpersonal relationships.

Shirom [11] notes s that, while early studies attempted to conceptualize burnout, the most widely recognized and accepted conceptualization comes from the pioneering work of Schaufeli [12] and Maslach [13]. They propose three distinct but empirically related dimensions of burnout: emotional exhaustion, depersonalization, and personal accomplishment [12–16].

Emotional exhaustion is considered the individual dimension of burnout and involves intense fatigue and a feeling of complete depletion after exhausting one's resources [3]. It is considered the central aspect of burnout [17–19] and is the most frequently reported aspect among those experiencing professional burnout, often linked to various workplace stressors [20,21]. Depersonalization represents the interpersonal dimension of burnout, characterized by detachment, indifference, disengagement, and a loss of enthusiasm toward work [20,22]. Many researchers view emotional exhaustion and depersonalization as the core dimensions of burnout [22–24]. In contrast, personal accomplishment is seen as the "self-evaluative" dimension of reflecting feelings of competence, achievement, and success, which diminish as burnout progresses [20,25].

This dimension encompasses both social and non-social aspects of accomplishment, emphasizing expectations related to professional effectiveness [26]. Compared to other sectors [27] and the general population [28], healthcare professionals experience notably higher burnout rates. For instance, a study conducted in the United States found that the prevalence of burnout among physicians was 37.9%, compared to 27.8% among non-physicians [29]. Furthermore, up to 60% of medical residents are affected by burnout with rates among residents being twice that of postdoctoral researchers [28,30]. Recent research indicates a continuous upward trend in burnout rates among physicians, with prevalence rising from 39% in 2013 to 46% in 2015 [29]. During the COVID-19 pandemic, studies revealed an alarming increase in burnout rates, highlighting a heightened vulnerability to mental health issues [28,31,32].

Ahola et al. [22] suggest that burnout is minimally influenced by socio-demographic factors, yet other studies indicate otherwise [33–36]. For instance, a meta-analysis found that women tend to experience slightly higher emotional exhaustion than men, while men show higher levels of depersonalization [33]. Similarly, several studies have reported that women experience significantly higher levels of burnout compared to men [34–36]. Conversely, a Syrian study found that men had higher levels of burnout than women [37]. Regarding age, numerous studies have highlighted variations in burnout levels [28,37,38]. Regarding marital status, Alhaffar et al. [37] found no significant influence on burnout levels.

Indeed, numerous studies have shown that, despite socio-demographic factors, burnout appears to be strongly linked to working conditions [20]. For example, the study by Alhaffar et al. [37] suggests that first-year residents experience lower burnout rates compared to those with 4 to 6 years of residency. It also reveals that more than one-third (35%) of residents encounter burnout during their advanced years of residency. On the other hand, it has been reported that burnout rates vary between 41% and 74% depending on the specialty [39]. For instance, Abdulrahman et al. [38] observed that burnout prevalence was lower in emergency medicine (87%) and radiology (89%) compared to other specialties. Similarly, for example, Alhaffar et al. [37] revealed that fifth-year residents had lower levels of personal accomplishment (PA) and the highest rates of emotional exhaustion (EE) and depersonalization (DP). Several studies have highlighted the imbalance between professional and personal life among residents [32]. Shalaby et al. [32] found that 27% of residents are dissatisfied with their social life, while other research [10,40] indicated that low salaries and poor exam performance contribute to higher burnout levels among medical residents [40]. The challenging

working conditions for medical residents, including excessive workloads and sleep deprivation, are significant risk factors for burnout [10,41,42].

Despite its importance, there is a lack of focused studies on specifically burnout levels among resident physicians. Therefore, the current study aims to assess the prevalence of Burnout Syndrome (BOS) among resident physicians and to identify contributing factors within this population. By examining emotional exhaustion, depersonalization, and personal accomplishment using the Maslach Burnout Inventory (MBI), the study seeks to uncover how work-related and work-life balance factors influence burnout among resident physicians in Italy. The research question guiding this study is: "What is the prevalence of burnout among resident physicians, and which factors, particularly related to work and work-life balance, are associated with higher levels of burnout in this population?"

METHODS

Study design and procedure

This study used a cross-sectional survey design to assess levels of personal accomplishment, depersonalization, and emotional exhaustion using the Italian version of the Maslach Burnout Inventory (MBI). Additionally, it explored burnout-related factors, including socio-demographic and work-related factors, and investigated their potential impact on work-life balance.

Study participants and sampling

The questionnaire was distributed to 350 medical trainees across two different hospitals in central Italy. The final sample consisted of 160 residents who completed the questionnaire. The survey was designed to segment the sample based on two main factors: socio-demographic and work-related. Socio-demographic factors included gender, age, family status, and the presence of children. Work-related factors assessed included overtime hours, workload (OHW), night shift workload (NSW), and work environment. The questionnaires were self-administered to residents in May 2023, and 160 questionnaires were deemed valid for analysis.

Study instruments

The primary tool used in this study was the Italian version of the Maslach Burnout Inventory (MBI) [20], which consists of 22 items measuring three dimensions of burnout syndrome: emotional exhaustion, depersonalization, and personal accomplishment. Participants rated each item on a scale from 0 to 6, reflecting the frequency of experiencing the described feelings. The emotional exhaustion subscale assesses feelings of being emotionally drained by work, the depersonalization subscale evaluates attitudes toward service users, and the personal accomplishment subscale measures feelings of competence and success in working with others.

In addition to the MBI, another questionnaire was administered to assess participants' perceptions of work-life balance. This questionnaire included the following items:

Free-time satisfaction (FTS): The question "Are you satisfied with your free time and of the way you manage it with your work?" assesses how satisfied individuals are with their free time and its management relative to their work demands. Responses range from 1 (very dissatisfied) to 5 (very satisfied), providing insight into how individuals feel about the balance between work and personal life.

Free-Time Satisfaction Reduction (FTRS): The question "Do you feel that work pressures reduce the quality of your free time devoted to family and social activities?" examines whether individuals believe that work pressures negatively affect the quality of their free time spent on family and social activities. Responses vary from 1 (Rarely/never) to 4 (always), indicating the frequency with which work-related stressors intrude on personal life.

Work-problems pervasiveness (WPP): The question "How often do you think about work issues outside of work hours?" measures how often individuals think about work-related issues outside of regular work hours. Responses range from 1 (Rarely/never) to 4 (always), reflecting the extent to which work-related thoughts persist beyond the workplace and potentially contribute to burnout.

Ethical aspects

Participants provided informed consent before completing the questionnaire. The study was conducted within the international research group "Healthy workplaces and workers well-being", in accordance with the Declaration of Helsinki, and approved by the local Institutional Review Board ("Bioethics Committee of the University of Chieti-Pescara"). To ensure anonymity, participants were not asked to provide specific details about their home school or professional activities.

Data analysis

Descriptive statistics were used to summarize and characterize the study population. The questionnaires were scored to assess burnout levels and calculate total scores for each of the MBI dimensions: emotional exhaustion, depersonalization, and personal accomplishment. To examine the relationships between the studied factors and burnout dimensions, mixed-effects models [44] were applied using the `lme4` package in R [43]. The `glmer` function was utilized to account for random effects due to individual differences and hierarchical structures in the data, allowing for a nuanced analysis of how various predictors influence burnout dimensions while controlling for these random effects.

RESULTS

Descriptive analysis

The descriptive analysis of the data reveals a diverse distribution of participant characteristics (Table 1). In terms of age distribution, the majority of respondents are young, with 61.9% being under 30 years, compared to 38.1% who were 30 years or older. Gender distribution shows a predominance of females, comprising 63.7% of the sample, while males account for 36.2%. First-year students are the most represented group at 33.8%, followed by second-year students at 28.7%, with only 7.5% in their fifth year.

Urology is the most prevalent specialty, constituting 21.25% of the sample followed by Radiology, representing 13.12% and 10% in General Medicine of the total sample. Emergency Medicine and Anesthesiology accounted for 7.5% and 6.88%, respectively. Internal Medicine and Nephrology each represent 6.25% of the total. General Surgery and Neurology are both represented at 4.38%, while Geriatrics follows closely with 3.75%. Radiation Therapy makes up 3.12% of the total. Cardiology, Pathology, and Psychiatry each represent 2.5%. Oncology and Infectious Diseases each account for 1.25% and 1.88%, respectively, the same proportion as Allergology. Occupational Medicine has the smallest representation at just 0.62%. These data highlight the diversity and varying degrees of focus among medical specialties.

Experience levels among participants are predominantly moderate, with 57.5% reporting moderate experience, and only 0.6% indicating very extensive experience. Regarding marital status, the majority are single (65%), while 24.4% are cohabiting, and 9.4% are married. A small percentage self-reported being divorced (1.2%). Most participants do not have children (93.8%), with only 5.6% having children and 0.6% not providing this information.

Work hours per week are predominantly moderate, with 72.5% of participants working a moderate number of hours. The distribution across different settings indicates that 22.5% spend less than 30 hours in hospital departments, while 92.5% work over 60 hours in surgical rooms, and 95% spend less than 5 hours in laboratories.

Regarding extra work hours, a significant majority (70.6%) report working between 6 and 10 extra hours per week. In terms of physical activity, 61.3% of participants express satisfaction with how they manage their free time alongside their work, whereas 38.8% are dissatisfied. The perception of work pressure affecting the quality of free time dedicated to family and social activities shows that 40% of participants believe this occurs frequently, and 36.2% experience it occasionally.

Regarding free-time satisfaction (FTS), the largest proportion of respondents indicated being Very satisfied, representing 31.88% of the total. This is followed by those who are dissatisfied at 38.75%, Very dissatisfied at 13.75%, Satisfied at 11.25%, and Indifferent at 4.38%. In terms of the impact of work pressures on FTRS, most responses fall into the frequently category (40%) and Occasionally (36.25%). The Always category is represented by 13.75%, while Rarely/Never accounts for 10%. For work-problems pervasiveness (WPP), the most frequent response is Frequently,

comprising 53.75% of the total. This is followed by Occasionally at 24.38%, Always at 10%, and Rarely/Never at 11.88%.

Burnout levels differ among participants. Specifically, 30% of individuals report experiencing high levels of emotional exhaustion, while 40% experience moderate levels. Additionally, 70% of the sample exhibits moderate levels of depersonalization, and 58.8% report a high sense of personal accomplishment.

Table 1. Demographic and professional characteristics of participants (N=160).

Gender		Frequency	Percentage
	Female	102	63.75
	Male	58	36.25
Family status			
	Cohabitant	39	24.38
	Divorced	2	1.25
	Married	15	9.38
	Single	104	65
Children			
	Yes	10	5.7
	No	150	94.3
Sport			
	No physical activity	62	38.75
	Physical activity	98	61.25
Academic level			
	1stYear	54	33.75
	2ndYear	46	28.75
	3rdYear	30	18.75
	4thYear	18	11.25
	5thYear	12	7.5
Specialty			
	Allergology	3	1.88
	Anesthesiology	11	6.88
	Cardiology	4	2.5
	Emergency Medicine	12	7.5
	General Medicine	16	10
	General Surgery	7	4.38
	Geriatrics	6	3.75
	Infectious Diseases	3	1.88
	Internal Medicine	10	6.25
	Nephrology	10	6.25
	Neurology	7	4.38
	Occupational Medicine	1	0.62
	Oncology	2	1.25
	Pathology	4	2.5

	Psychiatry	4	2.5
	Radiation Therapy	5	3.12
	Radiology	21	13.12
	Urology	34	21.25
Experience			
	Low	29	18.12
	Moderate	37	23.12
	Significant	92	57.5
	Extensive	1	0.62
	Very extensive	1	0.62
Extra hour			
	1-5	78	48.75
	6-10	31	19.38
	>10	4	2.5
	None	47	29.38
FTS			
	Dissatisfied	62	38.75
	Indifferent	7	4.38
	Satisfied	18	11.25
	Very dissatisfied	22	13.75
	Very satisfied	51	31.88
FTRS			
	Always	22	13.75
	Frequently	64	40
	Occasionally	58	36.25
	Rarely/Never	16	10
WPP			
	Always	16	10
	Frequently	86	53.75
	Occasionally	39	24.38
	Rarely/Never	19	11.88
NSW			
	40-50	105	65.62
	<40	16	10
	>50	39	24.38
OHW			
	1-5	16	10
	6-10	33	20.62
	>10	37	23.12

	None	74	46.25
EE			
	Low	48	30
	Moderate	64	40
	High	48	30
DP			
	Low	5	3.12
	Moderate	112	70
	High	43	26.88
PA			
	Low	94	58.75
	Moderate	60	37.5
	High	6	3.75

Note: *FTS = Free-Time Satisfaction; FTRS = Free-Time Satisfaction Reduction; WPP = Work-problems Pervasiveness; NSW = Night Shift Workload; OHW = Overtime Hours, Workload; EE = Emotional Exhaustion; DP = Depersonalization; PA = Personal Accomplishment.*

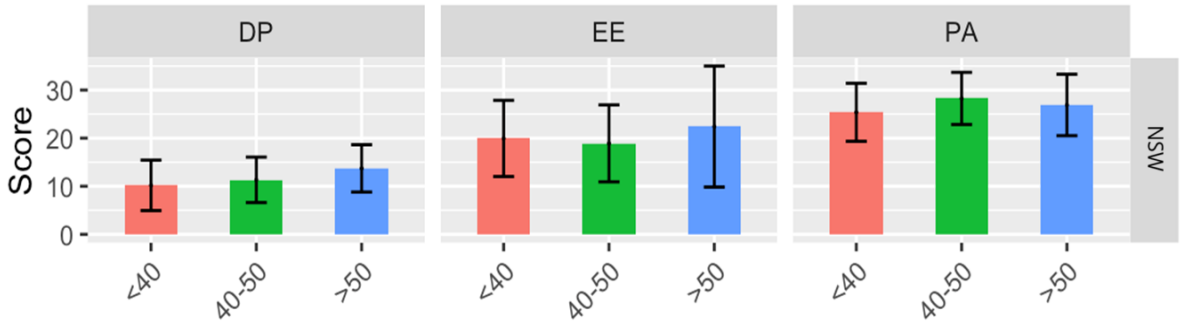
Effect of sociodemographic factors and physical activity on burnout level

Generalized linear mixed models were used with gender, age, family status, presence of children, and physical exercise as fixed effects and participants as random effects. The results indicate that gender has no significant effect on levels of emotional exhaustion (χ^2 (3) = 2.16, p = .539), depersonalization (χ^2(1) = 1.43, p = .232), or personal accomplishment (χ^2 (1) = 0.02, p = .899). Similarly, age does not show a significant impact on levels of emotional exhaustion (χ^2 (3) = 2.16, p = .539), depersonalization (χ^2 (3) = 3.24), p = .355), or personal accomplishment (χ^2 (3) = 0.51, p = .917). Similarly, family status also does not have significant effects on emotional exhaustion (χ2 (3) = 3.58, p = .311), depersonalization (χ^2 (3) = 3.90, p = .273), or personal accomplishment (χ2 (3) = 2.67, p = .445). No significant effect of the presence of children was revealed on emotional exhaustion (χ^2 (1) = 0.00, p = .999), depersonalization (χ^2(1) = 0.06, p = .809), or personal accomplishment (χ^2 (1) = 2.31, p = .128). Similarly, results showed that physical exercise does not influence emotional exhaustion (χ^2 (1) = 0.34, p = .559), depersonalization (χ^2 (1) = 3.61, p = .057), or personal accomplishment (χ^2 (1) = 0.89, p = .346) levels.

Effect of workload, experience, and specialty on burnout level

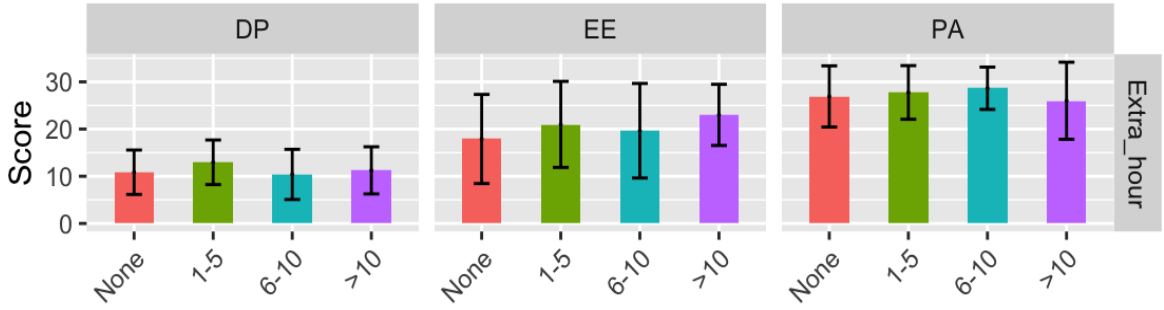
Generalized linear mixed models were employed with extra hours, OHW, NSW, and experience as fixed effects and participants as random effects (Figure 1). The results show a significant effect of extra hours on depersonalization levels (χ^2 (3) = 9.434, p = .024). No significant effects were found for emotional exhaustion (χ^2 (3) = 5.952, p = .113) or personal accomplishment (χ^2(3) = 1.774, p = .623). For OHW, significant effects were observed on both emotional exhaustion (χ^2(3) = 11.78, p = .003) and depersonalization (χ^2(3) = 8.21, p = .041), but no significant effect was found on personal accomplishment (χ^2(3) = 1.179, p = .753). Regarding NSW, no significant effects were found for emotional exhaustion (χ^2 (2) = 1.22, p = .543), personal accomplishment (χ^2(2) = 2.740, p = .253), or depersonalization (χ^2(2) = 3.361, p = .184). For years of experience, there was a significant effect on emotional exhaustion (χ^2 (4) = 11.43, p = .0024), but no significant effects were found for depersonalization (χ^2 (4) = 7.855, p = .096) or personal accomplishment (χ^2(4) = 5.090, p = .273).

Figure 1. Burnout level as a function of the number of hours between 10 pm and 7 am.



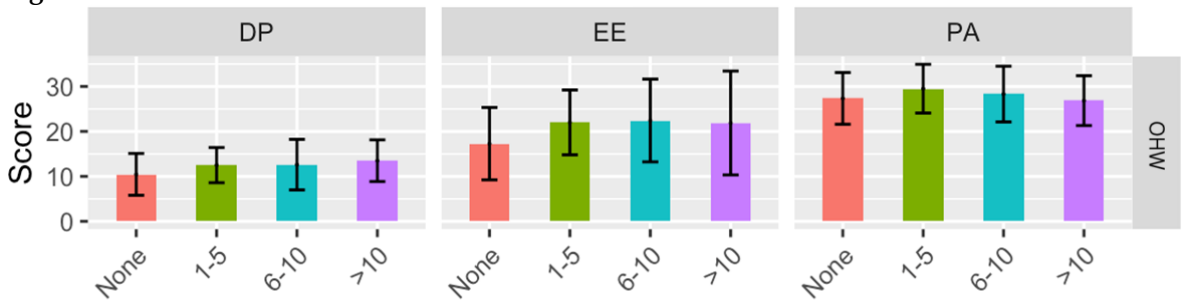
For extra hours effects (Figure 2), the contrast analyses showed a significant difference in the emotional exhaustion (EE) dimension level between working "1-5" extra hours and having no extra hours (Estimate =0.2023, SE = 0.0916, z = 2.209). Other comparisons, including those between >10 extra hours and the lower hour categories ("1-5", "6-10", "None"), as well as between 1-5 and 6-10 extra hours, did not show significant differences in EE levels. Regarding depersonalization, significant differences were observed between the groups working "1-5" and "6-10" extra hours (Estimate = 0.2372, SE = 0.0953, z-ratio = 2.489), and between those working "1-5" extra hours and those working no extra hours (Estimate = 0.2072, SE = 0.0842, z-ratio = 2.460). These findings indicate notable variations in depersonalization levels among these groups. Comparisons involving groups working more than 10 extra hours did not show significant differences compared to the other categories.

Figure 2. Burnout levels as a function of overtime hours.



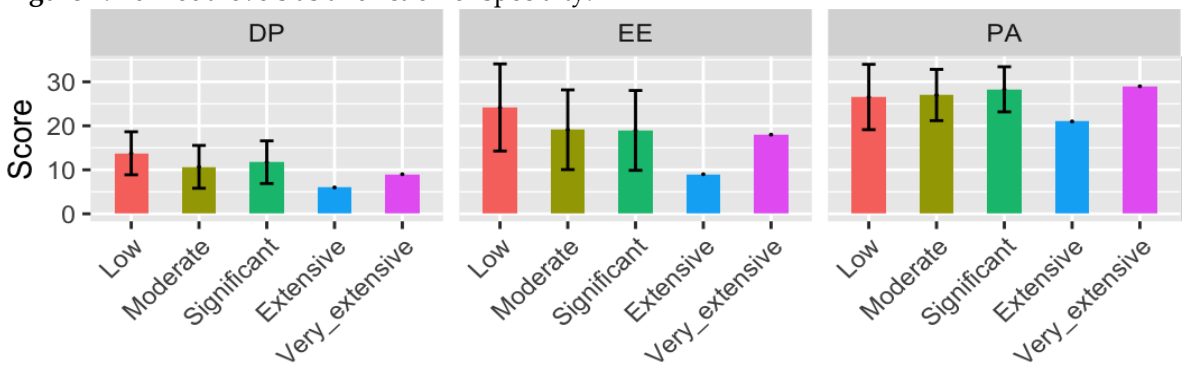
For OHW (How many hours of work per week are between 10 pm and 7 am?) effect on EE contrast analyses revealed a significant comparison between the groups working 6-10 hours and those with the "None" group (Estimate of 0.31026, SE = 0.105, z = 2.941). This indicates a notable difference in OHW levels between these two groups. Conversely, no significant differences were observed between the other comparisons: working more than 10 hours versus "1-5 hours", "6-10 hours", or "None"; nor between "1-5 hours" and "6-10 hours", or between "1-5 hours" and "None". Regarding depersonalization, the analysis shows a significant comparison between the group working more than 10 hours and the "None" group (Estimate = 0.24215, SE = 0.0961, z = 2.521). No other comparisons, such as between the group working 1-5 hours and the group working 6-10 hours, or between the group working 1-5 hours and the "None" group, showed significant differences (Figure 3).

Figure 3. Burnout level as a function of the number of work hours.



For experience effect on the EE levels, contrast analyses showed significant differences between several groups. Individuals in the "Low" experience exhibit notably higher levels of emotional exhaustion compared to those in the "Significant" experience group (Estimate = 0.2908, SE = 0.1043, z = 2.787). Similarly, a significant increase in emotional exhaustion is seen when comparing the "Low" experience group to the "Moderate" experience group (Estimate = 0.2471, SE = 0.1200, z = 2.059). Furthermore, the "Low" experience group also shows significantly higher levels of emotional exhaustion compared to the "Very extensive" experience group (Estimate = 0.1054, SE = 0.4904, z= 0.215). No other significant comparison was observed.

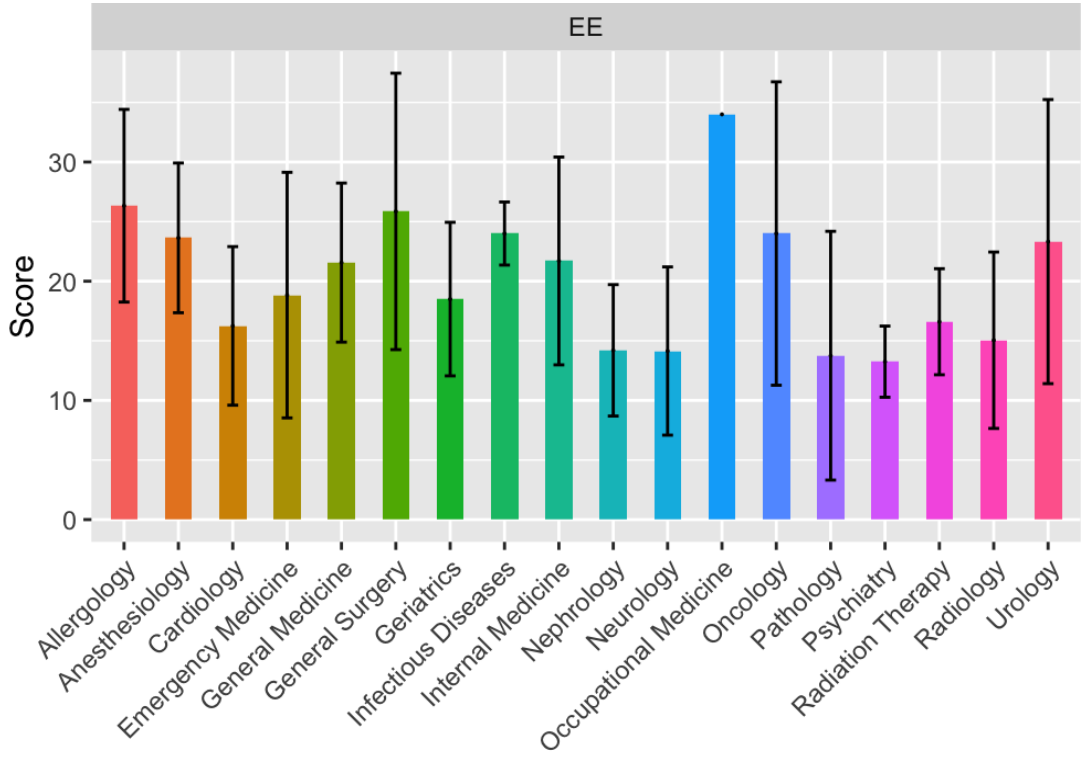
Figure 4. Burnout levels as a function of specialty.



Regarding specialty (Figures 4 and 5), the linear models suggest distinct patterns only on EE across various medical specialties in comparison with the baseline specialty (urology). No differences were found in depersonalization (DP) and personal accomplishment (PA).

Residents in nephrology exhibit a notable decrease in emotional exhaustion, with an estimate of -0.64547 (SE = 0.30746, t-value = -2.099). Similarly, neurology shows a significant reduction, with an estimate of -0.67814 (SE = 0.32230, t-value = -2.104). Pathology and radiology also demonstrate significantly lower levels of emotional exhaustion, with estimates of -0.86966 (SE = 0.35672, t-value = -2.438) and -0.65908 (SE = 0.28827, t-value = -2.286), respectively. Additionally, psychiatry presents a trend towards lower emotional exhaustion, with an estimate of -0.65888 (SE = 0.35672, t-value = -1.847), though it does not reach conventional statistical significance.

Figure 5. Burnout level (Emotional exhaustion) as a function of specialties.



In contrast, anesthesiology (estimate = -0.11194, SE = 0.30421, t-value = -0.368), cardiology (estimate = -0.49121, SE = 0.35672, t-value = -1.377), emergency medicine (estimate = -0.46404, SE = 0.30149, t-value = -1.539), general Medicine (estimate = -0.20953, SE = 0.29385, t-value = -0.713), general surgery (estimate = -0.16826, SE = 0.32230, t-value = -0.522), geriatrics (estimate = -0.36125, SE = 0.33026, t-value = -1.094), infectious diseases (estimate = -0.04741, SE = 0.38135, t-value = -0.124), and internal medicine (estimate = -0.22242, SE = 0.30746, t-value = -0.723) do not show substantial differences in emotional exhaustion compared to the baseline specialty (Urology).

These results indicate that residents in certain specialties, such as nephrology, neurology, pathology, and radiology, experience significantly lower levels of emotional exhaustion. In contrast, other specialties like anesthesiology, cardiology, and general Medicine exhibit levels of emotional exhaustion comparable to the baseline specialty (Urology).

Perceptions of work-life balance and its impact on EE

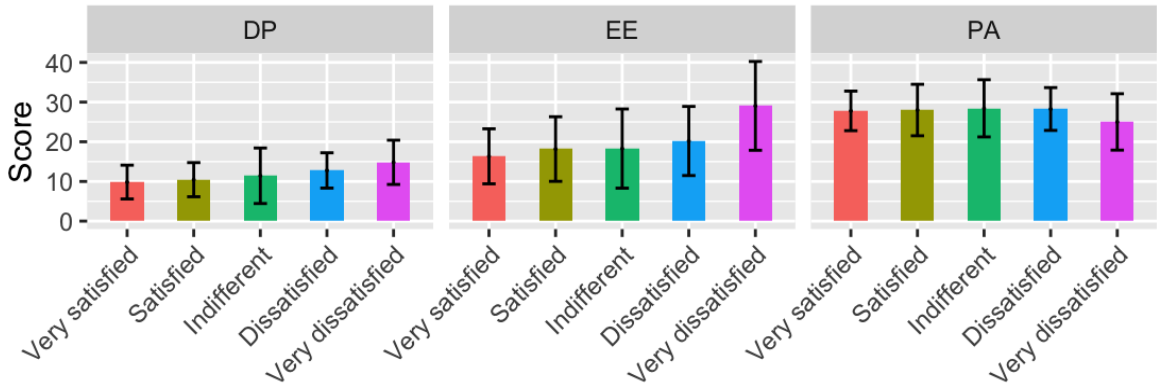
Regarding Work Pressures on FTRS (Figure 6), the results showed that frequent preoccupation (Frequently) does not significantly affect EE (Estimate = -0.17598, SE = 0.13214, t = -1.332). However, occasional preoccupation (Occasionally) is associated with a notable decrease in emotional exhaustion (Estimate = -0.32564, SE = 0.14594, t = -2.231). The most pronounced reduction is observed for "rare or no preoccupation" (Rarely/Never), which shows a substantial effect (Estimate = -0.51696, SE = 0.18548, t = -2.787), indicating that lower levels of work pressures are significantly associated with reduced emotional exhaustion.

Regarding Preoccupation with WPP, the results indicate that frequent preoccupation (Frequently) is significantly linked to a reduction in emotional exhaustion (Estimate = -0.33545, SE = 0.13163, t = -2.548) compared to the baseline "Always." Similarly, occasional preoccupation (Occasionally) has an even more pronounced effect (Estimate = -0.47007, SE = 0.14874, t = -3.160), while "rare or no preoccupation" (Rarely/Never) is also strongly associated with decreased emotional exhaustion (Estimate = -0.37357, SE = 0.16534, t = -2.259). These findings suggest that lower levels of preoccupation, whether frequent, occasional, or rare, are significantly associated with reduced emotional exhaustion.

Satisfaction with time management is significantly associated with levels of EE. Being "indifferent" to time management (Indifferent) shows a non-significant effect on emotional exhaustion (Estimate = -0.16425, SE = 0.19325, t = -0.850). Similarly, individuals who are "satisfied" with their time management (Satisfied) also demonstrate a non-significant reduction in emotional exhaustion (Estimate = -0.13194, SE = 0.12976, t = -1.017). In contrast, those who are "very dissatisfied" with their time management (Very dissatisfied) exhibit a significant increase in emotional exhaustion (Estimate = 0.38241, SE = 0.12027, t = 3.180). The most notable effect is observed among individuals who are "very satisfied" with their time management, showing a significant decrease in emotional exhaustion (Estimate = -0.20394, SE = 0.09162, t = -2.226).

In short, the results indicate that increased preoccupation with work issues, both at work and outside of work hours, and satisfaction with time management are significantly associated with lower emotional exhaustion.

Figure 6. Burnout level as a function of satisfaction with free time management.

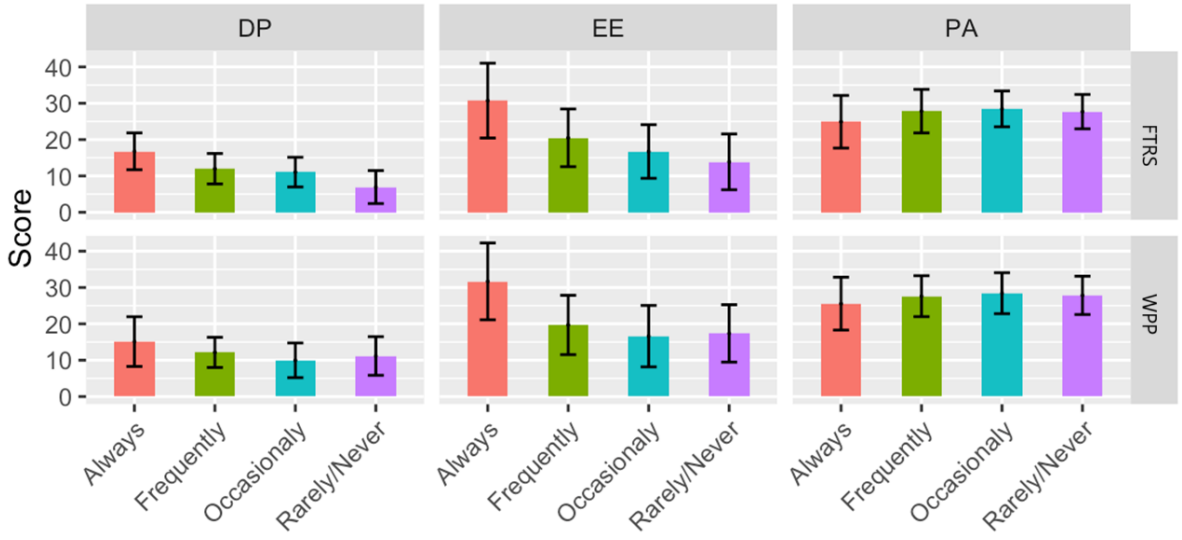


Perceptions of work-life balance and its impact on DP

Compared to the baseline level of "Always" for Work Pressures on FTRS, frequent preoccupation (Frequently) is associated with a significant reduction in depersonalization (Estimate = -0.29426, SE = 0.12160, t = -2.420). Occasional preoccupation (Occasionally) also leads to a significant decrease in depersonalization (Estimate = -0.32314, SE = 0.13431, t = -2.406). The most pronounced effect is observed for rare or no preoccupation (Rarely/Never), which shows a substantial reduction in depersonalization (Estimate = -0.87352, SE = 0.17070, t = -5.117). This suggests that lower levels of work pressures are significantly associated with decreased depersonalization.

For Preoccupation with WPP, none of the levels show a significant effect on depersonalization compared to the baseline. Frequent preoccupation (Frequently) (Estimate = 0.02225, SE = 0.12114, t = 0.184), occasional preoccupation (Occasionally) (Estimate = -0.15320, SE = 0.13688, t = -1.119), and rare or no preoccupation (Rarely/Never) (Estimate = 0.04267, SE = 0.15216, t = 0.280) does not significantly impact depersonalization.

Figure 7. Burnout level as a function of work pressures on FTRS and preoccupation with WPP.



Satisfaction with time management is significantly associated with levels of depersonalization. Specifically, being "indifferent" to time management (Indifferent) is associated with a non-significant reduction in depersonalization (Estimate = -0.238, SE = 0.182, t = -1.309). Similarly, individuals who are "satisfied" with their time management (Satisfied) show a marginally significant decrease in depersonalization (Estimate = -0.218, SE = 0.122, t = -1.786). In contrast, those who are "very dissatisfied" with their time management (Very dissatisfied) display a non-significant increase in depersonalization (Estimate = 0.138, SE = 0.11333, t = 1.222) compared to the baseline level "dissatisfied". The most pronounced effect is observed for individuals who are "very satisfied" with their time management, demonstrating a significant reduction in depersonalization (Estimate = -0.309, SE = 0.086, t = -3.589). These findings suggest that extreme levels of satisfaction with time management are significantly associated with changes in depersonalization, with high satisfaction correlating with decreased depersonalization.

In summary, the results reveal that lower levels of work pressures are significantly associated with reduced depersonalization, while variations in preoccupation with work issues outside of work hours and free-time satisfaction do not significantly affect depersonalization.

Perceptions of work-life balance and its impact on PA

Regarding Work Pressures on FTRS, the levels of frequent preoccupation (Frequently) (Estimate = 0.08560, SE = 0.07048, t = 1.214), occasional preoccupation (Occasionally) (Estimate = 0.10881, SE = 0.07784, t = 1.398), and rare or no preoccupation (Rarely/Never) (Estimate = 0.08226, SE = 0.09893, t = 0.831) do not show significant differences in personal accomplishment compared to the baseline level of "Always." For preoccupation with WPP, the effects of frequent preoccupation (Frequently) (Estimate = 0.06132, SE = 0.07021, t = 0.873), occasional preoccupation (Occasionally) (Estimate = 0.07438, SE = 0.07934, t = 0.938), and rare or no preoccupation (Rarely/Never) (Estimate = 0.07153, SE = 0.08819, t = 0.811) are not significant compared to the baseline level of "Always." Regarding Free-time satisfaction (FTS), none of the satisfaction levels show significant effects on personal accomplishment. Specifically, being "Indifferent" (Indifferent) (Estimate = -0.02865, SE = 0.05037, t = -0.569), "Very dissatisfied" (Very dissatisfied) (Estimate = -0.10564, SE = 0.06503, t = -1.624), and "Very satisfied" (Very satisfied) (Estimate = 0.00210, SE = 0.10132, t = 0.021) do not significantly differ from the "Satisfied" baseline. In summary, the analysis indicates that variations in free-time satisfaction, work pressures, and preoccupation with work issues outside of work hours do not significantly impact personal accomplishment.

DISCUSSION

Numerous studies indicate that most training physicians experience moderate to high levels of burnout across all three investigated dimensions [45–47]. Consistent with this, our results revealed

significantly high levels of burnout within our study population. An analysis of burnout dimensions reveals distinct patterns among the residents. Regarding EE, 30% of individuals report high levels, while an equal percentage report low levels. The majority, 40%, experience moderate levels of emotional exhaustion. For depersonalization (DP), a substantial 26.88% of participants report high levels, indicating a significant prevalence of this dimension among the residents. In contrast, only 3.12% report low levels of depersonalization, with 70% experiencing moderate levels. Lastly, personal accomplishment (PA) shows a markedly different trend, with only 3.75% of residents reporting high levels of personal accomplishment. The majority, 58.75%, report low levels, while 37.50% experience moderate levels. These findings underscore the high levels of emotional exhaustion and depersonalization among residents while highlighting the relatively lower sense of personal accomplishment, which may contribute to the overall burnout experienced by this group. These results align with existing research on burnout among healthcare professionals in Italy [48,49], suggesting a persistent issue that requires attention and intervention.

Investigating the impact of demographic factors on burnout levels among residents revealed no significant effects across the three dimensions of burnout. This finding is consistent with previous research that challenges the existence of a significant relationship between demographic factors and burnout levels [10,41]. Specifically, the analysis of EE levels by gender shows weaker differences, 35.29% of females report low levels of emotional exhaustion, compared to only 20.69% of males. Conversely, a higher proportion of males, 48.28%, experience moderate levels of emotional exhaustion, while 35.29% of females fall into this category. Regarding depersonalization (DP), 70.59% of females report high levels, slightly higher than the 68.97% of males with similar levels. Despite some studies highlighting significant differences in burnout levels between genders [50–53], our results indicate that the observed differences were not statistically significant. Similarly, in line with previous research [37], our results show that age does not have a significant effect on EE, DP, and PA levels. It is worth noting that few studies have found a significant effect of age on burnout among residents, with some recent research suggesting relatively high burnout levels among younger residents [32].

As previously mentioned, several studies have highlighted the impact of factors such as excessive workload [] and specialty [54,55] on burnout levels. Regarding workload (hours worked per week), our results did not show significant effects on EE or depersonalization (DP) levels. However, our findings revealed a significant effect of overtime on burnout levels. Specifically, individuals in the "None" group reported 20.83% with high levels of emotional exhaustion, 31.25% with moderate levels, and 35.42% with low levels. In contrast, those working "more than 10 hours" of overtime reported 50% with high levels and 50% with moderate levels of emotional exhaustion. Similarly, the "1 to 5 hours" group exhibited the highest proportion of high depersonalization, with 79.49% of individuals reporting high levels, 19.23% moderate levels, and only 1.28% low levels. Additionally, our results indicated a significant effect of night shifts on burnout levels. The "None" group showed a notably high prevalence of low emotional exhaustion (18.92%) compared to the "more than 10 hours" (40.54%), "6-10 hours" (39.39%), and "1-5 hours" groups (37.50%).

Analysis of high levels of EE by medical specialty reveals notable variations, confirming the results of previous studies [39,54–56]. For instance, the highest rates of emotional exhaustion were observed in general surgery (71.43%) and allergology (66.67%), followed by anesthesiology (45.45%), infectious diseases (33.33%), and cardiology (25.00%). In contrast, Neurology reported the lowest rate of emotional exhaustion at 14.29%. Regarding the prevalence of depersonalization, results indicate that Anesthesiology and Internal Medicine have very high rates at 90.91% and 90.00%, respectively. General surgery and nephrology also exhibit significant levels, at 85.71% and 80.00%. Urology follows with a high depersonalization rate of 76.47%. Psychiatry and Neurology show substantial levels at 75.00% and 71.43%, respectively. Geriatrics and Infectious Diseases report high rates of 66.67%. Cardiology and Emergency Medicine have moderate levels at 50.00% each. Pathology shows a lower rate of 50.00%, while Radiology displays a more balanced distribution with 42.86% high, 9.52% low, and 47.62% moderate depersonalization. Finally, Allergology reports the lowest high

depersonalization rate at 33.33%. These results corroborate findings from earlier research, such as that by Shalaby et al. [32], which shows burnout rates among residents varying between 30% and 74% across specialties. Additionally, this study aligns with evidence that surgical specialties tend to have higher burnout rates [54,55]. Numerous studies suggest significant links between work-life balance and burnout levels among residents. For instance, Shalaby [32] reports that 42.9% of residents were dissatisfied with their work-life integration. Similarly, the study by Shanafelt et al. [29] found that 40.2% of resident physicians expressed dissatisfaction, compared to only 23.2% of the non-medical population. To assess work-life balance, we utilized three key indicators.

Firstly, satisfaction with leisure time management allows us to gauge how individuals perceive the quality and organization of their leisure time about their professional obligations. In parallel, we examined the impact of work pressures on FTRS to determine the extent to which work-related constraints affect the quality of their leisure time dedicated to family and social activities. Finally, concern with WPP provides insight into how frequently individuals continue to think about work problems after office hours, which can influence their overall well-being and ability to disconnect. Together, these three indicators offer a comprehensive view of the balance between professional demands and personal needs, allowing us to evaluate how individuals manage their time and overall well-being.

Consistent with previous research highlighting significant links between work-life balance and burnout levels among residents [54,55], our results reflect similar trends. Regarding the management of leisure time, comparisons of EE levels between individuals who are "Very Dissatisfied" and those who are "Very Satisfied" reveal a notable difference. Among those who are "Very Dissatisfied," 54.55% report high levels of emotional exhaustion, whereas only 17.65% of those who are "Very Satisfied" report similar levels. In terms of depersonalization (DP), a marked disparity is also observed: 90.91% of the "Very Dissatisfied" individuals report high levels of depersonalization, compared to only 52.94% among the "Very Satisfied" group.

When managing work-related issues outside of work hours, there is a striking difference in EE levels between those who "Always" think about work and those who do so "Rarely/Never." Among those who "Always" think about work outside of work hours, 77.27% report high levels of emotional exhaustion, while only 12.50% of those who think about work "Rarely/Never" report high levels. Similarly, depersonalization (DP) levels show a notable contrast: 95.45% of individuals who "Always" think about work outside of work hours report high levels of depersonalization, compared to just 25.00% among those who do so "Rarely/Never."

Regarding the impact of work on family and social activities, EE levels show a clear difference between those who "Always" feel this impact and those who feel it "Rarely/Never." Among those who "Always" feel that work affects their family and social activities, 75.00% report high levels of emotional exhaustion, whereas only 21.05% of those who feel this impact "Rarely/Never" report similar levels. Depersonalization (DP) levels also show a significant contrast, with 75.00% of those who "Always" feel this impact reporting high levels of depersonalization, compared to 57.89% among those who feel it "Rarely/Never."

In summary, these results reveal a clear trend: individuals who are dissatisfied with their work-life balance present higher levels of emotional exhaustion and depersonalization compared to those who are satisfied with their work. This pattern highlights the strong link between work-life balance and burnout, with dissatisfaction correlating with higher burnout levels. As Kim Tae Gon [57] suggest, work-life balance refers to the allocation of time among work, family, and leisure activities. Based on current findings and previous research, it is evident that factors such as excessive workload, night shifts, and reduced family vacation time hinder individuals from maintaining satisfying personal relationships [32]. These conditions consequently increase susceptibility to burnout by exacerbating stress and exhaustion.

Strengths and limitations

This study has several strengths and limitations. First, it provides a comprehensive analysis of multiple dimensions of burnout—emotional exhaustion, depersonalization, and personal

accomplishment—offering a holistic view of the issue among resident physicians. Additionally, the results align with existing research, reinforcing their validity and contributing to the literature on burnout in healthcare professionals. The focus on work-life balance, particularly leisure time management, adds valuable insights for potential interventions, and the use of established measures, such as the Maslach Burnout Inventory, ensures a reliable assessment of burnout levels. However, the study is not without limitations. First, its cross-sectional design restricts our ability to establish causal relationships, necessitating longitudinal studies for a deeper understanding. The reliance on self-reported data may have introduced bias, as participants could underreport or overreport their experiences. Furthermore, a lack of demographic diversity in the sample might limit the representativeness of the findings, and the geographic focus on Italy could affect the generalizability of results to resident physicians in other regions. Lastly, while several variables were accounted for, unmeasured factors, such as personal circumstances and external stressors, could influence burnout levels and may not have been adequately controlled, which could have introduced a residual confounding bias.

CONCLUSION

Our results reveal that more than half of the residents interviewed are at significant risk for burnout [58-76]. This highlights the urgent need for regular monitoring and preventive strategies to address work stress and burnout [77-98]. Given the severe consequences burnout can have on the well-being of medical trainees and the crucial roles they fulfill in our national healthcare system, it is vital to take proactive steps to mitigate this issue.

Author Contributions: Conceptualization: LDG, AR, TG, SDS, LC. Methodology: HN, HW NQ. Software: LDG, AR. Validation: YR, DAA, and HC. Formal analysis: LDG, AR. Investigation: AR, TG, SDS, LC. Resources: KB, AR, MY, FC. Data curation: AR, TG, SDS, LC. Writing—original draft preparation: LDG, AR; Writing—review and editing: AR, FC, KB, MY. Visualization: all. Supervision: all. Project administration: LDG. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Publisher's Note: Edizioni FS stays neutral regarding jurisdictional claims in published maps and institutional affiliation.

References

1. Maslach C, Jackson SE. The measurement of experienced burnout. J Organ Behav. 1981;2:99–113.
2. Azam K, Khan A, Alam MT. Causes and adverse impact of physician burnout: a systematic review. J Coll Physicians Surg Pak. 2017;27:495–501.
3. Maslach C, Schaufeli WB, Leiter MP. Job burnout. Annu Rev Psychol. 2001;52:397–422.
4. Leiter MP. Key worklife areas contributing to health care burnout: reflections on the ORCAB project. Br J Health Psychol. 2015.
5. Molina-Praena J, Ramirez-Baena L, Gómez-Urquiza JL, Cañadas GR, De la Fuente EI, Cañadas-De la Fuente GA. Levels of burnout and risk factors in medical area nurses: A meta-analytic study. Int J Environ Res Public Health. 2018;15:2800.
6. Freudenberger HJ, Richelson G. Burn-out: The High Cost of High Achievement. Anchor Press; 1980.
7. Kahn R. Job burnout: Prevention and remedies. Public Welfare. 1978;36:61–63.
8. Enzmann D, Schaufeli WB, Janssen P, Rozeman A. Dimensionality and validity of the Burnout Measure. J Occup Organ Psychol. 1998;71:331–351.
9. Klimo Jr P, DeCuypere M, Ragel BT, McCartney S, Couldwell WT, Boop FA. Career satisfaction and burnout among US neurosurgeons: a feasibility and pilot study. World Neurosurg. 2013;80:e59–e68.
10. Attenello FJ, Buchanan IA, Wen T, Donoho DA, McCartney S, Cen SY, et al. Factors associated with burnout among US neurosurgery residents: a nationwide survey. J Neurosurg. 2018;129:1349–1363.
11. Shirom A. Reflections on the study of burnout. Work Stress. 2005;19:263–270.
12. Schaufeli WB, Dierendonck Dv, Gorp KV. Burnout and reciprocity: Towards a dual-level social exchange model. Work FTRSess. 1996;10:225–237.
13. Maslach C, Jackson SE. MBI-Human services survey. CPP. Mountain View, CA, USA; 1996.
14. Taris TW, Schreurs PJ, Schaufeli WB. Construct validity of the Maslach Burnout Inventory-General

Survey: A two-sample examination of its factor structure and correlates. Work Stress. 1999;13:223–237.
15. Maslach C, Jackson SE, Leiter MP. Maslach burnout inventory. Scarecrow Education; 1997.
16. De Hert S. Burnout in healthcare workers: prevalence, impact and preventative strategies. Local Reg Anesth. 2020;13:171–183.
17. Maslach C, Goldberg J. Prevention of burnout: New perspectives. Appl Prev Psychol. 1998;7:63–74.
18. Maslach C. Job burnout: New directions in research and intervention. Curr Dir Psychol Sci. 2003;12:189–192.
19. Koeske GF, Koeske RD. ConFTRSuct validity of the Maslach Burnout Inventory: A critical review and reconceptualization. J Appl Behav Sci. 1989;25:131–144.
20. Maslach C. What have we learned about burnout and health? Psychol Health. 2001;16:607–611.
21. Schaufeli WB, Van Dierendonck D. The conFTRSuct validity of two burnout measures. J Organ Behav. 1993;14:631–647.
22. Ahola K, Honkonen T, Isometsä E, Kalimo R, Nykyri E, Koskinen S, et al. Burnout in the general population: Results from the Finnish Health 2000 Study. Soc Psychiatry Psychiatr Epidemiol. 2006;41:11–17.
23. Schaufeli WB, Bakker AB. Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. J Organ Behav. 2004;25:293–315.
24. Halbesleben JR, Demerouti E. The conFTRSuct validity of an alternative measure of burnout: Investigating the English translation of the Oldenburg Burnout Inventory. Work Stress. 2005;19:208–220.
25. Leiter MP, Schaufeli WB. Consistency of the burnout construct across occupations. Anxiety Stress Coping. 1996;9:229–243.
26. Schaufeli WB, Buunk BP. Professional burnout. In: Handbook of Work and Health Psychology. 1996;1:383–425.
27. Yang S, Meredith P, Khan A. Stress and burnout among healthcare professionals working in a mental health setting in Singapore. Asian J Psychiatry. 2015;15:15–20.
28. Dyrbye LN, West CP, Satele D, Boone S, Tan L, Sloan J, et al. Burnout among US medical students, residents, and early career physicians relative to the general US population. Acad Med. 2014;89:443–451.
29. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Arch Intern Med. 2012;172:1377–1385.
30. Dyrbye L, Shanafelt T. A narrative review on burnout experienced by medical students and residents. Med Educ. 2016;50:132–149.
31. Chang J, Ray JM, Joseph D, Evans LV, Joseph M. Burnout and post-traumatic stress disorder symptoms among emergency medicine resident physicians during the COVID-19 pandemic. West J Emerg Med. 2022;23:251.
32. Shalaby R, Oluwasina F, Eboreime E, El Gindi H, Agyapong B, Hrabok M, et al. Burnout among residents: prevalence and predictors of depersonalization, emotional exhaustion and professional unfulfillment among resident doctors in Canada. Int J Environ Res Public Health. 2023;20:3677.
33. Purvanova RK, Muros JP. Gender differences in burnout: A meta-analysis. J Vocat Behav. 2010;77:168–185.
34. Ashkar K, Romani M, Musharrafieh U, Chaaya M. Prevalence of burnout syndrome among medical residents: experience of a developing country. Postgrad Med J. 2010;86:266–271.
35. Dyrbye LN, Burke SE, Hardeman RR, Herrin J, Wittlin NM, Yeazel M, et al. Association of clinical specialty with symptoms of burnout and career choice regret among US resident physicians. JAMA. 2018;320:1114–1130.
36. Linzer M, McMurray JE, Visser M, Oort FJ, Smets E, De Haes H. Sex differences in physician burnout in the United States and The Netherlands. J Am Med Womens Assoc. 2002;57:191–193.
37. Alhaffar BA, Abbas G, Alhaffar AA. The prevalence of burnout syndrome among resident physicians in Syria. J Occup Med Toxicol. 2019;14:1–8.
38. Abdulrahman M, Farooq MM, Al Kharmiri A, Al Marzooqi F, Carrick FR. Burnout and depression among medical residents in the United Arab Emirates: a multicenter study. J Fam Med Prim Care. 2018;7:435–441.
39. Ames SE, Cowan JB, Kenter K, Emery S, Halsey D. Burnout in orthopaedic surgeons: a challenge for leaders, learners, and colleagues: AOA critical issues. JBJS. 2017;99:e78.
40. West CP, Shanafelt TD, Kolars JC. Quality of life, burnout, educational debt, and medical knowledge

among internal medicine residents. JAMA. 2011;306:952–960.
41. Thomas NK. Resident burnout. JAMA. 2004;292:2880–2889.
42. Lancet T. Medical professionalism and physician wellbeing. Lancet. 2021;398:817.
43. Bates D, Maechler M, Bolker B, Walker S, Christensen RH, Singmann H, et al. Package 'lme4'. Convergence. 2015;12:2.
44. Bates D, Kliegl R, Vasishth S, Baayen H. Parsimonious mixed models. arXiv preprint arXiv:1506.04967. 2015.
45. Bria M, Baban A, Dumitrascu DL. Systematic review of burnout risk factors among European healthcare professionals. Cogn Brain Behav. 2012;16:423–452.
46. Zhou AY, Panagioti M, Esmail A, Agius R, Van Tongeren M, Bower P. Factors associated with burnout and stress in trainee physicians: a systematic review and meta-analysis. JAMA Netw Open. 2020;3:e2013761.
47. Naji L, Singh B, Shah A, Naji F, Dennis B, Kavanagh O, et al. Global prevalence of burnout among postgraduate medical trainees: a systematic review and meta-regression. CMAJ Open. 2021;9:E189–200.
48. Lupo R, Lezzi A, Conte L, Santoro P, Carvello M, Artioli G, et al. Work environment and related burnout levels: Survey among healthcare workers in two hospitals of Southern Italy. Acta Bio Medica Atenei Parmensis. 2021;92.
49. Lasalvia A, Amaddeo F, Porru S, Carta A, Tardivo S, Bovo C, et al. Levels of burnout among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of north-east Italy. BMJ Open. 2021;11:e045127.
50. Suchman AL, Roter DL, Green M, Lipkin Jr M. Physician satisfaction with primary care office visits. Med Care. 1993;31:1083–1092.
51. Berardo L, Gerges C, Wright J, Stout A, Shah H, Papanastassiou A, et al. Assessment of burnout prevention and wellness programs for US-based neurosurgical faculty and residents: a systematic review of the literature. J Neurosurg. 2020;135:392–400.
52. Golub JS, Weiss PS, Ramesh AK, Ossoff RH, Johns III MM. Burnout in residents of otolaryngology–head and neck surgery: a national inquiry into the health of residency training. Acad Med. 2007;82:596–601.
53. Tang OY, Dunn KA, Yoon JS, Ponce FA, Sonntag VK, Lawton MT. Neurosurgery resident wellness and recovery from burnout: a 39-year single-institution experience. World Neurosurg. 2020;138:e72–81.
54. Lawlor SK, Low CM, Carlson ML, Rajasekaran K, Choby G. Burnout and well-being in otolaryngology trainees: A systematic review. World J Otorhinolaryngol Head Neck Surg. 2022;8:118–125.
55. Becker JL, Milad MP, Klock SC. Burnout, depression, and career satisfaction: cross-sectional study of obstetrics and gynecology residents. Am J Obstet Gynecol. 2006;195:1444–1449.
56. Arora M, Diwan AD, Harris IA. Burnout in orthopaedic surgeons: a review. ANZ J Surg. 2013;83:512–515.
57. Kim TG. A study on work intensity, work-life balance, and burnout among Korean neurosurgeons after the enactment of the special act on Korean medical residents. J Korean Neurosurg Soc. 2021;64:644–664.
58. Chirico F. Navigating in the global workplace: Innovative strategies for combating new approach to preventing burnout, violence, preventing and workplace enhancing psychosocial well-being. Adv Med Psychol Public Health. 2024;1(3):108-109. Doi: 10.5281/zenodo.10897920.
59. Chirico F, Rizzo A. Tackling mental health disorders, violence, burnout, workplace post-traumatic stress disorders amidst climate change, and new global challenges: The crucial role of emotional management education. Adv Med Psychol Public Health. 2025;2(1):5-7. Doi: 10.5281/zenodo.11248392.
60. Chmielewski J, Wojciechowska M, Chirico F, Crescenzo P, Rizzo A, Starz R, et al. Job burnout in a sample of Polish paramedics–role of work experience, age and health behaviours. Ann Agric Environ Med. 2024;31(3):395-400.
61. Makkaoui M, Hannoun Fz, Ouazizi K, Rizzo A, Ali Da, Cherqui A, et al. Spirituality as predictor of psychological well-being at work in the Moroccan context: A cross-sectional study. J Health Soc Sci. 2024;9(2):279-293.
62. Qourrichi A, Ouazizi K, Saaliti E, Ait D, Ali Le, Hilal M, et al. The effect of learned helplessness on the psychological health of healthcare workers. J Health Soc Sci. 2024;9(1):129-143.
63. Rizzo A, Yildirim M, Maggio Mg, Khabbache H, Gomez-Salgado J, Bahramizadeh M, et al. Novel measures to assess work-life balance: A systematic review of last 5 years (2018-2023). J Health Soc Sci. 2023;3:0174-5912.
64. Maggio MG, Rizzo A, Stagnitti MC, Manuli A, Calabro' RS. System usability, stress and mood among teachers using distance learning. G Ital Psicol Med Lav. 2022;2(2):117-124. Doi: 10.69088/2022/PBLC6.

65. Mutongoza BH. Student-on-staff violence at South African universities: A qualitative study. G Ital Psicol Med Lav. 2023;1(2):50-56. Doi: 10.69088/2023/STDN4.
66. Cacciatori I, D'Auria C, Bruneri A, Rozza S. Prevalence of burnout syndrome among newly hired healthcare workers in Italy before and during the COVID-19 pandemic in Italy: A comparative cross-sectional study. G Ital Psicol Med Lav. 2021;1(2):225-237. Doi: 10.69088/2021/PRVL8.
67. Pompei A, Magnavita N. Sleep disorders and their interaction with occupational psychosocial risk factors in shift workers: A narrative review of the literature. G Ital Psicol Med Lav. 2021;1(2):176-205. Doi: 10.69088/2021/SLPD6.
68. Szadejko K, Scarcella C, Fioravanzo RE, Cadei L, Bonometti S, Goglioni R, et al. The impact of the COVID-19 pandemic on mental well-being of healthcare workers at Lago di Garda hospitals, Northern Italy. G Ital Psicol Med Lav. 2021;1(2):206-224. Doi: 10.69088/2021/THMP7.
69. Sacco A. Il fenomeno delle aggressioni a danno degli operatori sanitari: risultati di uno studio "cross sectional" effettuato in una Azienda Sanitaria Locale della Regione Lazio (Italia) [Physical violence against healthcare workers employed at a local health unit in the Lazio Region, Italy: A cross-sectional study]. G Ital Psicol Med Lav. 2022;2(1):50-56. Doi: 10.69088/2022/LFNM5. *Italian.*
70. Chirico F, Nucera G, Sacco A, Magnavita N. La violenza da parte di pazienti e accompagnatori a danno degli operatori d pronto soccorso: una revisione della normativa vigente e delle linee guida internazionali per la valutazione e la gestione del rischio [Violence toward healthcare workers employed in Emergency Departments: A review of Italian regulations and international guidelines for the risk assessment and management]. G Ital Psicol Med Lav. 2022;2(1):57-86. Doi: 10.69088/2022/LVLN6. *Italian.*
71. Rizzo A, Alfa R, Carlotta V, Sturniolo G, Trazzi L, Viola F. Burnout, decision-making and coping among healthcare workers: How the world was before the COVID-19 pandemic. G Ital Psicol Med Lav. 2022;2(2):105-116. Doi: 10.69088/2022/BRNT3.
72. Hossan D, Mansor ZD, Islam MdR, Khan AN, Jaharuddin NS, Jesmin NS. Relationship between motivational factors and employee engagement in Bangladesh's Readymade Garments (RMG) industry. G Ital Psicol Med Lav. 2022;2(2):91-104. Doi:10.69088/2022/RLTN2.
73. Crescenzo P, Tarchi L, Rizzo A. Prevalence of Burnout Syndrome among volunteer psychologists providing psychological support in Italy during the COVID-19 pandemic: The role of workload. G Ital Psicol Med Lav. 2024;4(2):131-139. Doi: 10.69088/2024/BRNT5.
74. Chirico F, Sacco A, Ferrari G, AIPMEL. Il ruolo del medico competente nel periodo pandemico e post-pandemico da COVID-19 in Italia: il Position paper dell'Associazione Italiana di Psicologia e Medicina del Lavoro (AIPMEL). [The role of occupational physician in Italy during and after the COVID-19 pandemic: A Position paper by the Italian Association of Psychology and Occupational Health (AIPMEL)]. G Ital Psicol Med Lav. 2021;1
75. Chirico F, Sacco A, Magnavita N. Workplace violence: Risk assessment is the basis for prevention. G Ital Psicol Med Lav. 2024;4(2): 92-98. Doi: 10.69088/2024/WRKP1
76. Chirico F, Magnavita N. Burnout Syndrome and Meta-Analyses: Need for Evidence-Based Research in Occupational Health. Comments on Prevalence of Burnout in Medical and Surgical Residents: A Meta-Analysis. Int J Environ Res Public Health. 2019, *16*, doi:10.3390/ijerph16091479. Int J Environ Res Public Health. 2020;17(3):741. Published 2020 Jan 23. doi:10.3390/ijerph17030741.
77. Sharma M. A protocol for assessing the readiness for practicing introspective meditations (manan dhyana) as a toll for reduction of stress among high-stress occupations. G Ital Psicol Med Lav. 2021;1(1):105-116. doi: 10.69088/2021/PRTC11.
78. Finistrella M, Luchina E. The effect of a Mindfulness-based stress reduction program on the mental health of a sample of Italian healthcare workers: A quasi-experimental study design. G Ital Psicol Med Lav. 2024;4(1):27-40. Doi: 10.69088/2024/THFF4.
79. Rizzo A, Yıldırım M, Aziz IA, Çağış ZG, Szarpak Ł, Nucera G, et al. Anxiety and Coping Strategies among Italian-Speaking Physicians: A Comparative Analysis of the Contractually Obligated and Voluntary Care of COVID-19 Patients. Healthcare. 2023;23(11).
80. Chirico F, Sacco A, Magnavita N. La medicina basata sulle evidenze scientifiche e l'attività di sorveglianza sanitaria: una revisione dei principi e delle esperienze in medicina del lavoro. [Evidence-based Medicine (EBM) and occupational health surveillance: A review of the principles and experiences in occupational health]. G Ital Psicol Med Lav. 2022;2(1):6-24. Doi:10.69088/2022/LMDC2. *Italian.*
81. Chirico F. Normativa, criticità e valutazione del rischio psicosociale lavorativo in Italia [Psychosocial hazards in the workplace: Regulations, challenges and risk assessment in Italy]. G Ital Psicol Med. 2022;2(1):1-5. doi: 10.69088/2022/NRMT1. *Italian.*

82. Hossan D, Mansor ZD, Islam MdR, Khan AN, Jaharuddin NS, Jesmin NS. Relationship between motivational factors and employee engagement in Bangladesh's Readymade Garments (RMG) industry. G Ital Psicol Med Lav. 2022;2(2):91-104. Doi:10.69088/2022/RLTN2.
83. Jochmannova L, Charvat M, Slukova PZ, Sucha M, Viktorova L. The decline in the provision of psychosocial Services during the COVID-19 pandemic and the barriers to moving to online forms of care from providers' perspectives. G Ital Psicol Med Lav. 2023;3(3):106-117. Doi: 10.69088/2023/THDC4.
84. Chirico F, Sacco A, Ferrari G. "Total Worker Health" strategy to tackle the COVID-19 pandemic and future challenges in the workplace. J Health Soc Sci. 2021;6(4):452-457. Doi: 10.19204/2021/ttlw1.
85. Lakhan R, Sharma M. Global health: A priority that persists. Adv Med Psychol Public Health. 2025;2(2):78-80. Doi: 10.5281/zenodo.12738127.
86. Bruno E, Turay T, Titi T. Il futuro della salute e sicurezza sul lavoro in Italia attraverso il coordinamento degli attori pubblici e i programmi di promozione della salute scolastici tra pari [The future of occupational health and safety system in Italy trough public actor's coordination and school-based peer education programs]. G Ital Psicol Med Lav. 2023;3(1):34-37. Doi: 10.69088/2023/LFTR6.
87. Bruno F, Mautone A, Ait Ali D, Fassima A, Khabbache H, Rizzo A. Evaluating Facebook scales: A systematic review of the psychological assessment tools. Adv Med Psychol Public Health. 2025;2(3):142-156. Doi: 10.5281/zenodo.13351015.
88. Rizzo A, Calandi L, Faranda M, Rosano MG, Carlotta V, Vinci E. Stigma against mental illness and mental health: The role of social media. Adv Med Psychol Public Health. 2025;2(2): 125-130. Doi: 10.5281/zenodo.13223184.
89. Zhussipbek G. The human right to health: Empathy and universal human dignity versus apathetic capitalism. Adv Med Psychol Public Health. 2025;2(1):60-71. Doi: 10.5281/zenodo.11672488.
90. Maggio MG, Rizzo A, Stagnitti MC, Manuli A, Calabro' RS. System usability, stress and mood among teachers using distance learning. G Ital Psicol Med Lav. 2022;2(2):117-124. Doi: 10.69088/2022/PBLC6.
91. Crescenzo P, Ritella G, Ligorio MB. The relationship between occupational health surveillance, emotions, and technology use in teachers. G Ital Psicol Med Lav. 2024;4(2):164-166. Doi: 10.69088/2024/THRL7.
92. Chirico F, Magnavita N. The Spiritual Dimension of Health for More Spirituality at Workplace. Indian J Occup Environ Med. 2019;23(2):99. Doi: 10.4103/ijoem.IJOEM_209_18.
93. Chirico F, Khabbache H, Rizzo A, Nucera G, Yıldırım M, Batra K, et al. Bridging ethics and spirituality in healthcare policies for a holistic response to climate change, new pandemics, and global health challenges: A call to action. Adv Med Psychol Public Health. 2024;1(4):170-173. Doi: 10.5281/zenodo.11068942.
94. Mangifesta R, Pollutri A, Pedata P, Giurgola C, Di Giampaolo L. Personal protective equipments and occupational stress in covid-19 era. J Biol Regul Homeost Agents. 2021; 35: 75-80.
95. Reale M, Costantini E, D'Angelo C, Coppeta L, Mangifesta R, Jaragrlapodi S, et al. Network between cytokines, cortisol and occupational stress in gas and oilfield workers. Int J Mol Sci. 2020; 21(3): 1118. Doi:10.3390/ijms21031118.
96. Forcella L, Bonfiglioli R, Cutilli P, Siciliano E, Di Donato A, Di Nicola M, et al. Analysis of occupational stress in high fashion clothing factory with upper limb biomechanical overload. Int Arch Occup Env Health. 2012; 85(5): 527-535. Doi: 10.1007/s00420-011-0702-z.
97. Boscolo P, Di Gioacchino M, Reale M, Muraro R, Di Giampaolo L. Work stress and innate immune response. Int J Immunopathol Pharmacol. 2011; 24(1):51-54.
98. Stocchi M, Giobbe T, Boscolo P, Di Giampaolo P, Di Giampaolo L. The development of organizational comfort: organizational training as strategic instrument for changing. G Ital Med Lav Erg. 2010; 32(4): 415-418.